

REMARKS

Claims 1-29 have been canceled and new claims 30-46 have been added to the application. New claims 30-46 recite the ozone water for use in cleaning semiconductor substrates and the production method for an ozone water for use in cleaning semiconductor substrates of the present invention in terms that comply with the requirements of the first and second paragraphs of 35 U.S.C. § 112 and that are novel under 35 U.S.C. § 102 and non-obvious under 35 U.S.C. § 103(a).

New claim 30 recites an ozone water containing ethanol or isopropyl alcohol in an amount of 5 µg/liter to 1 mg/liter of the ozone water. This limitation is supported in the specification on page 6, lines 1 through 7 from the bottom of the page.

New claims 31-38 recite a production method for an ozone water for use in cleaning semiconductor substrates in which ethanol or isopropyl alcohol, which suppresses a reduction of the half-life of ozone, is added to ultra-pure water through a porous polymer membrane having water repellency and ozone is subsequently dissolved in the ultra-pure water to which the ethanol or isopropyl alcohol has been added. The limitations that the alcohol is added to ultra-pure water, that ozone is subsequently dissolved in this ultra-pure water, that the ethanol or isopropyl alcohol is supplied

to a primary chamber separated from a secondary chamber in an enclosed cell by interposition of the porous polymer membrane, and the ultra pure water is supplied to the secondary chamber whereby said ethanol or isopropyl passes through the porous polymer membrane and is added to said ultra-pure water, is supported by the descriptions in the specification of the drawings (e.g., Fig. 1).

New claims 39-46 recite that in the production method of claims 31-38, respectively, in the step of dissolving ozone in the ultra-pure water to which the ethanol or isopropyl alcohol has been added, the ultra-pure water to which the ethanol or isopropyl alcohol has been added is supplied to an inside of a tetrafluoroethylene resin pipe and ozone gas is dissolved in said ultra-pure water to which the ethanol or isopropyl alcohol has been added by providing an ozone gas atmosphere outside of the tetrafluoroethylene resin pipe. Claims 39-46 are supported, for example, by the description of Fig. 3 on page 23 of the specification.

Referring to the Action and, first, to the first paragraph, 35 U.S.C. § 112, rejection, it is well known that a solvent will pass through a membrane from a solution of higher concentration to a solution of lower concentration. An organic solvent passes through a porous polymer membrane having water repellency. In the present

invention and, more particularly, in the production method for an ozone water for use in cleaning semiconductor substrates of the present invention as defined in the new claims in which the organic solvent has been limited to ethanol or isopropyl alcohol, the ethanol or isopropyl alcohol, which is a liquid, is evaporated in the first chamber and becomes a gas and passes through the porous membrane and dissolves in the ultra pure water in the second chamber. Such mechanism is achievable under ordinary conditions when it is considered that the amount of ethanol and isopropyl alcohol to be added to the ultra pure water is an infinitesimal quantity (5 µg/liter to 1 mg/liter). A person of ordinary skill in the art can understand that under such circumstances, a sufficient amount of alcohol evaporates and passes through the porous high molecular membrane.

Therefore, the specification is enabling for a production method for an ozone water as recited in the claims and removal of the first paragraph, 35 U.S.C. § 112, rejection is in order and is respectfully requested.

Referring to the second paragraph, 35 U.S.C. § 112, rejection, new claims 30-46 avoid the recitations identified in the rejection as being indefinite and precisely recite that ozone is dissolved in ultra-pure water to which ethanol or isopropyl alcohol has been

added and that such addition is made through the porous polymer membrane.

Removal of the second paragraph, 35 U.S.C. § 112, rejection is also in order and is respectfully requested.

The claims also stand rejected in the Action under 35 U.S.C. § 103(a) as being unpatentable over Oya et al., US 6,517,999 ("Oya"), alone and in view of JP 11-029795 ("JP '795").

Applicants respectfully submit that a person of ordinary skill in the art would not have had any reason or motivation to modify the method of Oya as required to obtain an ozone water as recited in claim 30 of the application or as required to obtain the production method of an ozone water of the present invention.

Oya discloses a photoresist film removing solution that is described as including pure water, an acid aqueous solution, an alkaline aqueous solution; an organic solvent (which may be an alcohol including isopropanol); "and a mixture thereof". (Col. 6, line 40). The Office admits that Oya does not disclose a solution of pure water containing an organic solvent in a range of 0.1 µg/liter to 1 mg/liter (5 µg/liter to 1 mg/liter in new claim 30 and claims 35-38), but characterizes the concentration of the organic solvent as being a result-effective variable.

However, as explained in MPEP § 2144.05(II)(B), "[a]

particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." (Emphasis added). The concentration of the organic solvent in Oya is not described as achieving any recognized result in terms of an ozone water to be used in the cleaning of semiconductor substrates or as achieving any other result when present within a range in terms of  $\mu\text{g/liter}$  to  $1\text{ mg/liter}$  as recited in the present claims.

In the present invention, the ozone water is used in the cleaning of semiconductor substrates and the amount of ethanol or isopropanol in the ozone water is controlled to be within the range of  $5\text{ }\mu\text{g/liter}$  to  $1\text{ mg/liter}$  so that "the dissolved ozone concentration is not reduced substantially and advantageously no organic carbon remains on the surface of the semiconductor substrate". (See, for example, page 6, lines 3-5 from the bottom of the page). Furthermore, the specified amount of the ethanol or isopropanol suppresses the reduction of the half-life of the ozone.

Oya suggests nothing concerning an ozone water to be used in the cleaning of semiconductor substrates and the Office has not shown or explained why a person of ordinary skill in the art would be motivated to provide a mixture of a pure water and,

particularly, an ultrapure water in which an amount, or concentration, of ethanol or isopropanol is regulated so as to be as small as 5 µg/liter to 1 mg/liter, for use in removing photoresist films.

The Aller decision cited by the Office also does not support the Office's position. As noted in the Action, Aller held that "where the general conditions of a claim are disclosed in the prior art", it is not inventive to discover the optimum or workable ranges by routine experimentation. Oya does not disclose the general conditions of the present claims. Oya discloses nothing concerning an amount of organic solvent to be mixed with pure water in the method disclosed therein.

The Office appears to be suggesting that Oya discloses an amount of organic solvent in pure water of from 0 to 100%. Such range, however, is not a disclosure of the general conditions of the claims of the present application, nor would such the claimed range be discoverable from such broad range by "routine optimization."

Moreover, the Office has not shown that Oya or other prior art enables the preparation of ozone water containing amounts of ethanol or isopropanol of from 5 µg/liter to 1 mg/liter. It is well established that to support a rejection for obviousness under

35 U.S.C. § 103(a), the prior art must be enabling.

Oya, alone, and in combination with JP '795, also does not disclose and does not suggest a production process for ozone water as recited in the claims in the application where ethanol or isopropyl alcohol is added to pure water or an ultra-pure water through a porous polymer membrane and does not suggest such process where ozone is dissolved in said ultra pure water containing ethanol or isopropanol by supplying the ultra-pure water to which the ethanol or isopropyl alcohol has been added to an inside of a tetrafluoroethylene resin pipe and providing an ozone gas atmosphere outside of the tetrafluoroethylene resin pipe as now claimed.

Removal of the 35 U.S.C. § 103(a) rejections is also in order and is respectfully solicited.

The foregoing is believed to be a complete and proper response to the Office Action dated December 23, 2008, and is believed to place this application in condition for allowance. If, however, minor issues remain that can be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number indicated below.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of

PATENT APPLN. NO. 10/522,717  
RESPONSE UNDER 37 C.F.R. §1.111

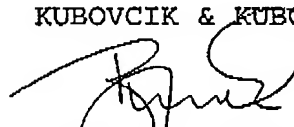
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time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,

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